

Dina Mistry

NETWORK SCIENTIST · INFECTIOUS DISEASE MODELER · DATA SCIENCE RESEARCHER

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Summary

Researcher with an interdisciplinary background in physics, network science, and epidemiology. 6+ years experience modeling real world complex systems, contagion phenomena, and data driven models of diverse human contact networks. My interests lie in understanding the foundations of complex systems and developing tools and methods for data driven research in health, misinformation, and social good.

Education

Northeastern University

Boston, MA

PH.D. IN PHYSICS

01/01/2014 - 01/01/2019

Dissertation: The Heterogeneous Nature of Contagion Processes in Complex Networks, Advisor: Prof. Alessandro Vespignani

Northeastern University

Boston, MA

M.Sc. IN PHYSICS

09/01/2012 - 01/01/2014

University of Toronto

Toronto, Canada

HON. B.Sc. IN PHYSICS & ASTRONOMY, MINOR IN MATHEMATICS WITH HIGH DISTINCTION

09/10/2007 - 06/12/2012

Undergraduate Thesis: The Axisymmetric Geometry of Saturn's Magnetic Fields, Advisor: Prof. Sabine Stanley

Skills & Expertise

Programming Python (NumPy, Pandas, scikit-learn, NLTK, Cartopy, PySpark), C++, R, SQL

Visualization Matplotlib, d3, Gephi

Software \LaTeX , Git

Experience

Institute for Disease Modeling, The Bill & Melinda Gates Foundation

500 5th Avenue Seattle, WA,
98109

POSTDOCTORAL RESEARCH SCIENTIST

NETWORK EPIDEMIOLOGY AND BEHAVIOR

07/13/2020 - PRESENT

- Modeling strategies for reopening schools in King County, Washington during the COVID-19 pandemic
- Developing agent based models of herd immunity and changes in behavior
- Presenting ongoing COVID-19 forecasting and analysis to local and state public health officials to inform ongoing control strategies
- Modeling health information campaign strategies in social networks to promote mask usage and social distancing in Senegal during COVID-19
- Developing open source tools to model testing, contact tracing, and other interventions for infectious disease transmission in networks
- Developing a Python package to generate data-driven human contact networks around the globe for research on public health
- Modeling the role of social trust in acceptance of health (mis)information during COVID-19
- Collaborating with software development and test engineers on open source tools for public health research

Institute for Disease Modeling, Intellectual Ventures

3150 139th Avenue SE
Bellevue, WA, 98112

POSTDOCTORAL RESEARCH SCIENTIST

NETWORK EPIDEMIOLOGY AND BEHAVIOR

02/04/2019 - 07/13/2020

- Modeling the control and mitigation of COVID-19 pandemic in human contact networks in the US and global populations
- Presented COVID-19 forecasting and analysis to local and state public health officials to inform ongoing control strategies
- Developing open source tools to model testing, contact tracing, and other interventions for infectious disease transmission in networks
- Developing a Python package to generate data-driven human contact networks around the globe for public health research
- Modeling contagion-like adoption of awareness and health behaviors in social networks
- Modeling the role of social trust and the long standing effects of memory of disease risk in acceptance of health (mis)information
- Collaborating with software development and test engineers on open source tools for public health research

Northeastern University

177 Huntington Avenue,
Boston, MA, 02115

GRADUATE RESEARCHER, MOBS LAB, NETWORK SCIENCE INSTITUTE

SYNTHETIC CONTACT NETWORKS

10/15/2015 - 01/23/2019

- Developed adaptive algorithms to generate synthetic human contact networks using multiple data sources for diverse populations
- Modeling infectious disease spreading in data-driven synthetic contact networks
- Implemented MCMC methods and computational methods to infer epidemiological parameters and validate with serological data
- Maintenance of database with contact networks for 300+ global locations
- Supervised junior graduate students
- Invited speaker at the 2017 Conference on Complex Systems

H1N1 PANDEMIC SCENARIO ANALYSIS

01/04/2015 - 01/23/2019

- Characterized global epidemic spreading patterns across different scenarios
- Analyzed the predictability of and visualized stochastic micro-simulations of multiple pandemic scenarios
- Analyzed micro-simulations and commercial airline mobility network data using statistical mechanics, network science, information theoretic measures, and unsupervised machine learning algorithms


SPREADING OF ZIKA VIRUS IN THE AMERICAS (WWW.ZIKA-MODEL.ORG)

01/03/2016 - 05/28/2017

- Developed a stochastic data-driven vector-borne model of the 2016 Zika outbreak in real-time; collaborating with international research groups
- Aided in streamlined analysis pipeline of simulation forecasts for time sensitive reports delivered to public health agencies (CDC, WHO)
- Collected, processed, and analyzed daily epidemiological case report data from 40 Pan-American countries for model calibration

COVER MUSIC NETWORK

09/04/2014 - 12/22/2014

- Scraped a database of musicians and cover songs (whosampled.com) to create a temporal network of connected artists
- Structured, cleaned, analyzed, and visualized a network with 70,000+ cover songs and 28,000+ artists spanning over 400 years
- Presented findings at final examination for PHYS 5116: Complex Networks (link to slides )

COMMITTED ACTIVISTS AND THE RESHAPING OF STATUS-QUO SOCIAL CONSENSUS

05/01/2013 - 10/22/2015

- Developed agent based models of negotiation on conventions and opinion adoption in temporal social networks
- Explored campaign strategies to reduce the time and critical mass needed to drive populations towards consensus, as well as the hindering effects of community structures (echo chambers)
- Presented findings at the 2017 International School and Conference on Network Science

Software

OPEN SOURCE SOFTWARE

Core Developer

SYNTHPOPS: PYTHON, PYPI | [HTTP://SYNTHPOPS.ORG/](http://SYNTHPOPS.ORG/)

03/09/2020 - Present

Contributor

COVASIM: PYTHON, PYPI | [HTTPS://COVASIM.ORG](https://COVASIM.ORG)

03/15/2020 - Present

Presentations

INVITED TALKS

Network Science for Social Good (NetSci 2019)

DIVERSIFY NETSCI

Burlington, VT

05/27/2019

Data Science and Methods 573, University of Washington

GUEST LECTURER ON NETWORK SCIENCE

Seattle, WA

02/28/2019

Institute for Disease Modeling

THE EFFECTS OF COMPLEX NETWORKS ON INFECTIOUS DISEASE SPREADING

Bellevue, WA

09/27/2018

Humanyze

EXPLORING THE EFFECTS OF COMPLEX NETWORKS ON CONTAGION PHENOMENA

Palo Alto, CA

09/03/2018

Conference on Complex Systems

THE INFLUENCE OF CULTURAL AND SOCIETAL DIVERSITY ON EPIDEMIC SPREADING

Cancun, Mexico

09/19/2017

PROFESSIONAL PRESENTATIONS

Institute for Disease Modeling Symposium (IDM Symposium 2020)	(Virtual, Postponed) Seattle, WA
THE LONGSTANDING EFFECTS OF DISEASE AWARENESS, MEMORY, AND SOCIAL TRUST ON INFECTIOUS DISEASE SPREADING IN SOCIAL NETWORKS	05/29/2019
International School and Conference on Network Science (NetSci 2020)	Burlington, VT
DIVERSITY, EQUITY, & INCLUSION IN NETWORK SCIENCE AND SOCIETY	05/29/2019
International School and Conference on Network Science (NetSci 2019)	Burlington, VT
INFERRING HIGH-RESOLUTION DISEASE SPECIFIC HUMAN MIXING PATTERNS	05/29/2019
3MinuteThesis, GWISE, Snell Library, Northeastern University	Boston, MA
DATA-DRIVEN APPROACHES TO INFECTIOUS DISEASE MODELING AND THE ROLE OF HUMAN INTERACTION NETWORKS	10/16/2018
International Conference on Complex Networks	Boston, MA
A DATA-DRIVEN APPROACH TO INFER SOCIAL CONTACT NETWORKS IN THE CONTEXT OF INFECTIOUS DISEASE MODELING	03/05/2018
Grad Research Panel, Snell Library, Northeastern University	Boston, MA
DATA-DRIVEN APPROACHES TO STOCHASTIC INFECTIOUS DISEASE MODELING	02/28/2018
International School and Conference on Network Science (NetSci 2017)	Indianapolis, IN
COMMITTED ACTIVISTS AND THE RESHAPING OF STATUS-QUO SOCIAL CONSENSUS	06/22/2017
POSTER PRESENTATIONS	
Epidemics	Charleston, SC
THE LONGSTANDING EFFECTS OF DISEASE AWARENESS AND SOCIAL MEMORY ON INFECTIOUS TRANSMISSION IN NETWORKS	12/04/2019
Research, Innovation, and Scholarship Expo, Northeastern University	Boston, MA
USING DATA-DRIVEN MODELS TO INFER SOCIAL CONTACT PATTERNS IN THE CONTEXT OF EPIDEMICS	04/07/2016

Publications

* Indicates equal contribution

Exemplars in Africa: Evaluating the impact of the 100 Mille Etudiants program to increase adoption of protective behaviors against COVID-19 in Dakar, Senegal

D. Mistry*, L. A. Skrip*, N. Noori*, M. Sall, I. Ba, A. Oron, and B. M. Althouse. *Manuscript in progress.*

SynthPops: A Generative Model of Synthetic Contact Networks.

D. Mistry, C. C. Kerr, D. J. Klein, and B. M. Althouse. *Manuscript in progress.*

Maximizing education while minimizing COVID-19 risk: priorities and pitfalls for reopening schools

J. Cohen, **D. Mistry**, C. C. Kerr, D. J. Klein. *Manuscript in progress.*


The longstanding effects of disease awareness, trust, and memory on infectious disease transmission in social contact networks.

D. Mistry, L. Hébert-Dufresne, and B. M. Althouse. *Manuscript in progress.*


Controlling SARS-CoV-2 via test-trace-quarantine.

C. C. Kerr, **D. Mistry***, R. M. Stuart*, K. Rosenfeld, G. R. Hart, P. Selvaraj, R. C. Núñez, J. A. Cohen, R. G. Abeyasuriya, L. George, B. Hagedorn, M. Jastrzebski, M. Fagalde, J. Duchin, M. Famulare, and D. J. Klein. *Manuscript under review.*
<https://www.medrxiv.org/content/10.1101/2020.07.15.20154765v3> 

Modelling the impact of reducing control measures on the COVID-19 pandemic in a low transmission setting.

N. Scott, A. Palmer, D. Delport, R. G. Abeyasuriya, R. M. Stuart, C. C. Kerr, **D. Mistry**, D. J. Klein, R. Sacks-Davis, K. Heath, S. Hainsworth, A. Pedrana, M. Stooze, D. P. Wilson, M. Hellard. *Manuscript under review.* <https://www.medrxiv.org/content/10.1101/2020.06.11.20127027v1> 

Determining the optimal strategy for reopening schools, work and society in the UK: balancing earlier opening and the impact of test and trace strategies with the risk of occurrence of a secondary COVID-19 pandemic wave.

J. Panovska-Griffiths, C. C. Kerr, R. M. Stuart, **D. Mistry**, D. J. Klein, R. M. Viner, C. Bonell. *Lancet Child Adolesc Health.* 2020.
[https://doi.org/10.1016/S2352-4642\(20\)30250-9](https://doi.org/10.1016/S2352-4642(20)30250-9) 

Covasim: an agent-based model of COVID-19 dynamics and interventions.

C. C. Kerr, R. M. Stuart, **D. Mistry**, R. G. Abeyasuriya, G. R. Hart, K. Rosenfeld, P. Selvaraj, R. C. Núñez, B. Hagedorn, L. George, A. Izzo, A. Palmer, D. Delport, C. Bennette, B. Wagner, S. Chang, J. A. Cohen, J. Panovska-Griffiths, M. Jastrzebski, A. P. Oron, E. Wenger, M. Famulare, D. J. Klein. <https://www.medrxiv.org/content/10.1101/2020.05.10.20097469v1>

Seeding COVID-19 across sub-Saharan Africa: an analysis of reported importation events across 40 countries.

L. A. Skrip, P. Selvaraj, B. Hagedorn, A. L. Ouédraogo, N. Noori, **D. Mistry**, J. Bedson, L. Hébert-Dufresne, S. V. Scarpino, B. M. Althouse. *Manuscript under review.* <https://www.medrxiv.org/content/10.1101/2020.04.01.20050203v2>

Spread of infectious disease and social awareness as parasitic contagions on clustered networks.

L. Hébert-Dufresne, **D. Mistry**, B. M. Althouse. *Manuscript under review.* <https://arxiv.org/pdf/2003.10604.pdf>

Inferring high-resolution human mixing patterns for disease modeling.

D. Mistry, M. Litvinova, A. Pastore y Piontti, M. Chinazzi, L. Fumanelli, M. F. C. Gomes, S. A. Haque, Q. Liu, K. Mu, X. Xiong, M. E. Halloran, I. M. Longini, S. Merler, M. Ajelli, A. Vespignani. *Manuscript under review.* <https://arxiv.org/abs/2003.01214>

Characterizing the global spread of epidemics and their predictability through human mobility networks.

D. Mistry, K. Sun, A. Pastore y Piontti, M. F. C. Gomes, L. Rossi, A. Vespignani. *Manuscript in progress.*

Quantifying the risk of Zika virus local transmission in the continental US during the 2015-2016 ZIKV epidemic.

K. Sun, Q. Zhang, A. Pastore-Piontti, M. Chinazzi, **D. Mistry**, N. E. Dean, D. P. Rojas, S. Merler, P. Poletti, L. Rossi, M. E. Halloran, I. M. Longini, A. Vespignani. *BioMed Central Medicine*. 16. 1. 195. 2018. <https://doi.org/10.1186/s12916-018-1185-5>

Spreading of Zika virus in the Americas.

Q. Zhang, K. Sun, M. Chinazzi, A. Pastore-Piontti, N. E. Dean, D. P. Rojas, S. Merler, **D. Mistry**, P. Poletti, L. Rossi, M. Bray, M. E. Halloran, I. M. Longini, A. Vespignani. *Proceedings of the National Academy of Sciences*. 114. 22. E4334-E4343. 2017. <https://doi.org/10.1073/pnas.1620161114>

Committed activists and the reshaping of status-quo social consensus.

D. Mistry, Q. Zhang, N. Perra, A. Baronchelli. *Phys. Rev. E*. 92. 042805. 2015. <https://doi.org/10.1103/PhysRevE.92.042805>

Reports & Other Writing

Schools are not islands: we must mitigate community transmission to reopen schools.

J. Cohen, **D. Mistry**, C. C. Kerr, Michael Famulare, and D. J. Klein. *Report on Infohub*

Modeling countermeasures for a balanced reopening in King County, Washington.

K. Rosenfeld, C. C. Kerr, J. Cohen, R. Núñez, G. Hart, **D. Mistry**, P. Selvaraj, and D. J. Klein. *Report on InfoHub*

COVID-19 intervention effectiveness and epidemic trends for Oregon: a model-based analysis.

C. C. Kerr, B. Hagedorn, **D. Mistry**, and D. J. Klein. *Report on Infohub*

Professional Service & Leadership

CONFERENCES, INSTITUTES, AND WORKSHOPS

2020	Parallel Session Organizer: Vaccine Hesitancy & Misinformation , IDM Symposium 2020	(Virtual, Postponed) Seattle, WA
2020	Co-Organizer & Reviewer , NetSci 2020 Financial Support Committee	(Virtual) Rome, Italy
2020	Co-Organizer , 2nd Annual Diversify NetSci, NetSci 2020	(Virtual) Rome, Italy
2020	Co-Organizer , The Confusions of a Young Scientist, NetSci 2020	(Virtual) Rome, Italy
2020	Program Committee , NetSci 2020	(Virtual) Rome, Italy
2020	Program Committee , NetSci-X 2020 Winter Conference	Tokyo, Japan
2019	Co-Organizer , Inaugural Diversify NetSci, NetSci 2019	Burlington, VT
2018	Program Committee , International Conference on Complex Networks	Boston, MA
2018	Art of Networks local organizer , International Conference on Complex Networks	Boston, MA
2018	Paper Unwind Co-Organizer: Society of Young Network Scientists (SYNS) , International Conference on Complex Networks	Boston, MA

PROFESSIONAL SOCIETIES

2019-2020	Chair , Society for Young Network Scientists (SYNS)	
2018	Women's Summer Retreat Organizer , GWISE (Graduate Women in Science and Engineering)	Cambridge, MA

PEER REVIEW

2020	Manuscript Reviewer , Nature Communications
2020	Manuscript Reviewer , Communications Physics
2019-2020	Manuscript Reviewer , PLOS Computational Biology
2019	Manuscript Reviewer , Chaos AIP
2017	Manuscript Subreviewer , PLOS ONE

DEPARTMENTAL SERVICE

2018	Senior Grad Panel, Graduate School & Research , Dept. of Physics, Northeastern University	Boston, MA
2017	Panel member, Diversity and Inclusion Town Hall , College of Science, Northeastern University	Boston, MA
2017	Professional Development Workshop Organizer , Dept. of Physics, Northeastern University	Boston, MA
2016-2018	Graduate Student Union Dept. Leader , Dept. of Physics, Northeastern University	Boston, MA
2014-2016	Physics Graduate Student Representative , Northeastern University	Boston, MA
2012	Transit of Venus Outreach Science Volunteer , Dept. of Astronomy & Astrophysics	Toronto, Canada
2011-2012	Vice President of Academic Affairs , Physics & Astronomy Student Union, University of Toronto	Toronto, Canada

Advanced Schools & Workshops

Vermont University	Burlington, VT
WORKSHOP ON INVASION IN ECOLOGICAL NETWORKS	08/25/2019 - 08/31/2019

Université Laval	Quebec City, Canada
COMPLEX NETWORKS WINTER WORKSHOP	12/15/2018 - 12/22/2018

University of Washington	Seattle, WA
7TH ANNUAL SUMMER INSTITUTE IN STATISTICS AND MODELING IN INFECTIOUS DISEASES	07/05/2015 - 07/22/2015

Certificates obtained in the modules:

- Probability and Statistical Inference
- Stochastic Epidemic Models with Inference
- Simulation-based Inference for Epidemiological Dynamics
- MCMC I & II for Infectious Diseases

Awards & Honors

2015	Summer Institute in Statistics and Modeling in Infectious Diseases Scholarship , 7th Annual Summer Institute	University of Washington
2012-2014	Graduate Teaching Assistantship Award , Department of Physics	Northeastern University
2012	Anna & Alex Beverly Memorial Fellowship , for future graduate studies	University of Toronto
2012	Marie Skłodowska-Curie Association Undergraduate Scholarship , for academic excellence in Physics	University of Toronto
2011	Undergraduate Summer Research Award , Highly competitive research assistantship award. Conducted experiments to study the nonlinear growth of stalactites. <i>Advisor: Prof. Stephen Morris.</i>	University of Toronto
2008-2012	Dean's List of Scholars , Faculty of Arts & Science	University of Toronto
2008	C. L. Burton Scholarship for Mathematics and Physics , Faculty of Arts & Science	University of Toronto
2007	Top Scholar's Scholarship , Faculty of Arts & Science	University of Toronto
2007	President's Entrance Scholarship , Faculty of Arts & Science	University of Toronto

Teaching

2014	Physics Lab Instructor , U.S. Pathway Program, a summer program for international students	<i>Northeastern University</i>
2012-2014	Physics Lab Instructor , Introductory Physics Labs (16 sections), Department of Physics	<i>Northeastern University</i>
2013-2014	Physics Workshop Leader , (6 sections) Department of Physics	<i>Northeastern University</i>
2012	Interactive Learning Sessions Teaching Assistant , Department of Physics	<i>Northeastern University</i>
2011	AST201H1 Teaching Assistant , Department of Astronomy & Astrophysics	<i>University of Toronto</i>

Media

'COVID NEAR YOU' CROWDSOURCES DATA TO PREDICT NEW HOT SPOTS WIRED

PROJECTING THE SPREAD OF ZIKA The Atlantic, New Scientist, Homeland Security News Wire, WBUR Boston NPR's News Station

PHD PROFILE: Canis lupus Graduate Student Newsletter, Northeastern University

Music and Performances

I have been playing the steel pan (native to the island nation of Trinidad and Tobago) since the age of 10, and performing publicly since the age of 14. From 14 through 18, I was a member of 3 performance bands, including 2 steel pan bands and a Jazz/Motown Ensemble. Most recently, I have joined the **Seattle Steel Pan Project**. My main instruments are the Double Tenor and Tenor Pans, though I am also known to play the Double Seconds, 6 Bass, Treble Bass, and Cello Pans.

SEATTLE STEEL PAN PROJECT

Redmond Library	10/12/2019	Redmond, WA
Seattle University	09/22/2019	Seattle, WA
Jackson Street Jazz Walk	09/07/2019	Seattle, WA
University Heights	09/07/2019	Seattle, WA
CID Summer Cinema Hing Hay Park	08/24/2019	Seattle, WA
Belltown Crush	08/24/2019	Seattle, WA
Sullivan Center Tukwila	08/21/2019	Tukwila, WA
Normandy Park Music in the Park	08/11/2019	Normandy, WA
Othello Park International Festival	08/11/2019	Othello, WA
Seattle Caribbean Festival	07/28/2019	Seattle, WA
Dance and Splash	07/13/2019	Seattle, WA
Nordstrom's Downtown Seattle	07/12/2019	Seattle, WA
Fremont Solstice Parade	06/22/2019	Fremont, WA
Renton Technical College Commencement	06/20/2019	Renton, WA
Highline College	05/23/2019	Des Moines, WA
Tulalip Casino and Resort	04/13/2019	Tulalip, WA
Powered By Women, Langston Hughes	03/30/2019	Seattle, WA